

SEQUENCE LISTING

(1) GENERAL INFORMATION:

- (i) APPLICANT: BROEKAERT, WILLEM F.
CAMMUE, BRUNO P.A.
OSBORN, RUPERT W.
REES, SARAH B.
TERRAS, FRANKY R.G.
VANDERLEYDEN, JOZEF
- (ii) TITLE OF INVENTION: BIOCIDAL PROTEINS
- (iii) NUMBER OF SEQUENCES: 59
- (iv) CORRESPONDENCE ADDRESS:
(A) ADDRESSEE: CUSHMAN DARBY & CUSHMAN
(B) STREET: 1100 New York Avenue, N.W.
(C) CITY: Washington
(D) STATE: D. C.
(E) COUNTRY: USA
(F) ZIP: 20005
- (v) COMPUTER READABLE FORM:
(A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0, Version #1.25
- (vi) CURRENT APPLICATION DATA:
(A) APPLICATION NUMBER: US 08/002,480
(B) FILING DATE: 04-JAN-1993
(C) CLASSIFICATION:
- (viii) ATTORNEY/AGENT INFORMATION:
(A) NAME: KOKULIS, PAUL N.
(B) REGISTRATION NUMBER: 16,773
(C) REFERENCE/DOCKET NUMBER: 99042/SEE.36525/US/A
- (ix) TELECOMMUNICATION INFORMATION:
(A) TELEPHONE: (202) 861-3000
(B) TELEFAX: (202) 822-0944

(2) INFORMATION FOR SEQ ID NO:1:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 44 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

Gln Lys Leu Cys Glu Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly
1 5 10 15

[illegible]

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 36 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Gln Lys Leu Cys Glu Arg Pro Ser Gly Thr Xaa Ser Gly Val Cys Gly
1 5 10 15

Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg
20 25

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 30 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Gln Lys Leu Cys Glu Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly
1 5 10 15

Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Asn Leu Glu Lys
20 25 30

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

Gln Lys Leu Cys Glu Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly
1 5 10 15

Asn Asn Asn Ala Cys Lys Asn
20

(2) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 25 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His
 25 30
 Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe
 35 40 45
 Asn Cys
 50

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 20 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Glu Val Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn
 1 5 10 15
 Thr Gly His Cys
 20

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 50 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn
 1 5 10 15
 Thr Lys His Cys Asp Asp Gln Cys Lys Ser Trp Glu Gly Ala Ala His
 20 25 30
 Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe
 35 40 45
 Asn Cys
 50

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 50 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn
1 5 10 15
Thr Lys His Cys Asp Asn Lys Cys Lys Ser Trp Glu Gly Ala Ala His
20 25 30
Gly Ala Cys His Val Arg Ser Gly Lys His Met Cys Phe Cys Tyr Phe
35 40 45
Asn Cys
50

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 47 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Lys Thr Cys Glu Asn Leu Ser Gly Thr Phe Lys Gly Pro Cys Ile Pro
1 5 10 15
Asp Gly Asn Cys Asn Lys His Cys Lys Asn Asn Glu His Leu Leu Ser
20 25 30
Gly Arg Cys Arg Asp Asp Phe Xaa Cys Trp Cys Thr Arg Asn Cys
35 40 45

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 49 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

Asn Leu Cys Glu Arg Ala Ser Leu Thr Trp Thr Gly Asn Cys Gly Asn
1 5 10 15
Thr Gly His Cys Asp Thr Gln Cys Arg Asn Trp Glu Ser Ala Lys His
20 25 30
Gly Ala Cys His Lys Arg Gly Asn Trp Lys Cys Phe Cys Tyr Phe Asp
35 40 45
Cys

[illegible]

(A) LENGTH: 4 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

1

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 4 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

1

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 5 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

1

5

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 51 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

Gln Lys Leu Cys Glu Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly
1 5 10 15
Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Asn Leu Glu Lys Ala Arg
20 25 30
His Gly Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys Tyr
35 40 45
Phe Pro Cys
50

(2) INFORMATION FOR SEQ ID NO:20:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 50 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn
1 5 10 15
Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His
20 25 30
Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe
35 40 45
Asn Cys
50

(2) INFORMATION FOR SEQ ID NO:21:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 50 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn
1 5 10 15
Thr Lys His Cys Asp Asp Gln Cys Lys Ser Trp Glu Gly Ala Ala His
20 25 30
Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe
35 40 45

[illegible]

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 49 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23;

Lys Thr Cys Glu Asn Leu Ser Gly Thr Phe Lys Gly Pro Cys Ile Pro
1 5 10 15
Asp Gly Asn Cys Asn Lys His Cys Lys Asn Asn Glu His Leu Leu Ser
20 25 30
Gly Arg Cys Arg Asp Asp Phe Xaa Cys Trp Cys Thr Arg Asn Cys
35 40 45

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 49 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Asn Leu Cys Glu Arg Ala Ser Leu Thr Trp Thr Gly Asn Cys Gly Asn
1 5 10 15
Thr Gly His Cys Asp Thr Gln Cys Arg Asn Trp Glu Ser Ala Lys His
20 25 30
Gly Ala Cys His Lys Arg Gly Asn Trp Lys Cys Phe Cys Tyr Phe Asp
35 40 45
Cys

(2) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 45 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

Asn Thr Cys Glu Asn Leu Ala Gly Ser Tyr Lys Gly Val Cys Phe Gly
1 5 10 15
Gly Cys Asp Arg His Cys Arg Thr Gln Glu Gly Ala Ile Ser Gly Arg
20 25 30
Cys Arg Asp Asp Phe Arg Cys Trp Cys Thr Lys Asn Cys
35 40 45

(2) INFORMATION FOR SEQ ID NO:26:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 46 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Asn Thr Cys Glu His Leu Ala Asp Thr Tyr Arg Gly Val Cys Phe Thr
1 5 10 15
Asn Ala Ser Cys Asp Asp His Cys Lys Asn Lys Ala His Leu Ile Ser
20 25 30
Gly Thr Cys His Asp Trp Lys Cys Phe Cys Thr Gln Asn Cys
35 40 45

(2) INFORMATION FOR SEQ ID NO:27:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 47 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

Lys Thr Cys Glu Leu Asn Ala Asp Thr Tyr Arg Gly Pro Cys Phe Thr
 1 5 10 15
 Thr Gly Ser Cys Asp Asp His Cys Lys Asn Lys Glu His Leu Leu Ser
 20 25 30
 Gly Arg Cys Arg Asp Asp Val Arg Cys Trp Cys Thr Arg Asn Cys
 35 40 45

(2) INFORMATION FOR SEQ ID NO:28:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 47 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

Arg His Cys Glu Ser Leu Ser His Arg Phe Lys Gly Pro Cys Thr Arg
 1 5 10 15
 Asp Ser Asn Cys Ala Ser Val Cys Glu Thr Glu Arg Phe Ser Gly Gly
 20 25 30
 Asn Cys His Gly Phe Arg Arg Arg Cys Phe Cys Thr Lys Pro Cys
 35 40 45

(2) INFORMATION FOR SEQ ID NO:29:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 48 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

Arg Val Cys Met Gly Lys Ser Ala Gly Phe Lys Gly Leu Cys Met Arg
 1 5 10 15
 Asp Gln Asn Cys Ala Gln Val Cys Leu Gln Glu Gly Trp Gly Gly Gly
 20 25 30

0050504 044001

Asn Cys Asp Gly Val Met Arg Gln Cys Lys Cys Ile Arg Gln Cys Trp
 35 40 45

(2) INFORMATION FOR SEQ ID NO:30:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 47 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

Lys Ile Cys Arg Arg Arg Ser Ala Gly Phe Lys Gly Pro Cys Met Ser
 1 5 10 15
 Asn Lys Asn Cys Ala Gln Val Cys Gln Gln Glu Gly Trp Gly Gly Gly
 20 25 30
 Asn Cys Asp Gly Pro Phe Arg Arg Cys Lys Cys Ile Arg Gln Cys
 35 40 45

(2) INFORMATION FOR SEQ ID NO:31:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 150 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: both
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

GAGCTTTGCG AGAAGGCTTC TAAGACTTGG TCTGGAAACT GCGGAAACAC TGGACATTGC 60
 GATAACCAAT GCAAGTCTTG GGAGGGAGCT GCTCATGGAG CTTGCCATGT TAGAAACGGA 120
 AAGCATATGT GCTTCTGCTA CTTCAACTGC 150

(2) INFORMATION FOR SEQ ID NO:32:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 60 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: both
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

GAGGTTTGCG AGAAGGCTTC TAAGACTTGG TCTGGAAACT GCGGAAACAC TGGACATTGC 60

(2) INFORMATION FOR SEQ ID NO:33:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 150 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: both
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

GAGCTTTGCG AGAAGGCTTC TAAGACTTGG TCTGGAAACT GCGGAAACAC TAAGCATTGC 60
GATGATCAAT GCAAGTCTTG GGAGGGAGCT GCTCATGGAG CTTGCCATGT TAGAAACGGA 120
AAGCATATGT GCTTCTGCTA CTTCAACTGC 150

(2) INFORMATION FOR SEQ ID NO:34:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 150 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: both
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

GAGCTTTGCG AGAAGGCTTC TAAGACTTGG TCTGGAAACT GCGGAAACAC TAAGCATTGC 60
GATAACAAGT GCAAGTCTTG GGAGGGAGCT GCTCATGGAG CTTGCCATGT TAGATCTGGA 120
AAGCATATGT GCTTCTGCTA CTTCAACTGC 150

(2) INFORMATION FOR SEQ ID NO:35:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 141 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: both
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

AAGACTTGCG AGAACCTTTC TGGAACTTTC AAGGGACCAT GCATTCCAGA TGGAACTGC 60
AACAAGCATT GCAAGAACAA CGAGCATCTT CTTTCTGGAA GATGCAGAGA TGATTTCNNN 120
TGCTGGTGCA CTAGAAACTG C 141

(2) INFORMATION FOR SEQ ID NO:36:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 147 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

```

AACCTTTGCG AGAGAGCTTC TCTTACTTGG ACTGGAAACT GCGGAAACAC TGGACATTGC      60
GATACTCAAT GCAGAACTG GGAGTCTGCT AAGCATGGAG CTTGCCATAA GAGAGGAAAC      120
TGGAAGTGCT TCTGCTACTT CGATTGC                                           147

```

(2) INFORMATION FOR SEQ ID NO:37:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 43 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

```

Ala Leu Ser Cys Gly Thr Val Asn Ser Asn Leu Ala Ala Cys Ile Gly
1           5           10           15
Tyr Leu Thr Gln Asn Ala Pro Leu Ala Arg Gly Cys Cys Thr Gly Val
          20           25           30
Thr Asn Leu Asn Asn Met Ala Xaa Thr Thr Pro
          35           40

```

(2) INFORMATION FOR SEQ ID NO:38:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 43 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

```

Ala Leu Ser Cys Gly Thr Val Asn Ser Asn Leu Ala Ala Cys Ile Gly
1           5           10           15
Tyr Leu Thr Gln Asn Ala Pro Leu Ala Arg Gly Cys Cys Thr Gly Val
          20           25           30
Thr Asn Leu Asn Asn Met Ala Xaa Thr Thr Pro
          35           40

```

(2) INFORMATION FOR SEQ ID NO:39:

Val Val Arg Gly Leu Asn Asn Ala Ala Arg Thr Thr Leu
 35 40 45

(2) INFORMATION FOR SEQ ID NO:42:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 44 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

Ala Leu Asn Cys Gly Gln Val Asp Ser Lys Asn Lys Pro Cys Leu Thr
 1 5 10 15
 Tyr Val Gln Gly Gly Pro Gly Gly Pro Ser Gly Leu Cys Cys Asn Gly
 20 25 30
 Val Arg Asp Leu His Asn Gln Ala Gln Ser Ser Gly
 35 40

(2) INFORMATION FOR SEQ ID NO:43:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 44 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

Ala Ile Ser Cys Gly Gln Val Ala Ser Ala Ile Ala Pro Cys Ile Ser
 1 5 10 15
 Tyr Ala Arg Gly Gln Gly Ser Gly Pro Ser Ala Gly Cys Cys Ser Gly
 20 25 30
 Val Arg Ser Leu Asn Asn Ala Ala Arg Thr Thr Ala
 35 40

(2) INFORMATION FOR SEQ ID NO:44:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 26 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: both
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

AAAGAATTCA ARYTNTGYSA RMGNCC

(2) INFORMATION FOR SEQ ID NO:45:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 32 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: both
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

AAAGAATTCT TGNGCNGGRA ANACRTARTT RC

32

(2) INFORMATION FOR SEQ ID NO:46:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 29 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: both
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

AAAGAATTCG GNACNTGGWS NGGNGTNTG

29

(2) INFORMATION FOR SEQ ID NO:47:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: both
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

AAAGAATTC

9

(2) INFORMATION FOR SEQ ID NO:48:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 414 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: both
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 16..255

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

GTATTATTAG TGATC ATG GCT AAG TTT GCG TCC ATC ATC GCA CTT CTT TTT	51
Met Ala Lys Phe Ala Ser Ile Ile Ala Leu Leu Phe	
1 5 10	
GCT GCT CTT GTT CTT TTT GCT GCT TTC GAA GCA CCA ACA ATG GTG GAA	99
Ala Ala Leu Val Leu Phe Ala Ala Phe Glu Ala Pro Thr Met Val Glu	
15 20 25	
GCA CAG AAG TTG TGC GAA AGG CCA AGT GGG ACA TGG TCA GGA GTC TGT	147
Ala Gln Lys Leu Cys Glu Arg Pro Ser Gly Thr Trp Ser Gly Val Cys	
30 35 40	
GGA AAC AAT AAC GCA TGC AAG AAT CAG TGC ATT AAC CTT GAG AAA GCA	195
Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Asn Leu Glu Lys Ala	
45 50 55 60	
CGA CAT GGA TCT TGC AAC TAT GTC TTC CCA GCT CAC AAG TGT ATC TGC	243
Arg His Gly Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys	
65 70 75	
TAC TTT CCT TGT TAATTTATCG CAACTCTTT GGTGAATAGT TTTTATGTAA	295
Tyr Phe Pro Cys	
80	
TTTACACAAA ATAAGTCAGT GTCACATATCC ATGAGTGATT TTAAGACATG TACCAGATAT	355
GTTATGTTGG TTCGTTATA CAAATAAAGT TTTATTCACC AAAAAAAAAA AAAAAAAAAA	414

(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 80 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

Met Ala Lys Phe Ala Ser Ile Ile Ala Leu Leu Phe Ala Ala Leu Val
1 5 10 15
Leu Phe Ala Ala Phe Glu Ala Pro Thr Met Val Glu Ala Gln Lys Leu
20 25 30
Cys Glu Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly Asn Asn Asn
35 40 45
Ala Cys Lys Asn Gln Cys Ile Asn Leu Glu Lys Ala Arg His Gly Ser
50 55 60
Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys
65 70 75 80

(2) INFORMATION FOR SEQ ID NO:50:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 284 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: both
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

(A) NAME/KEY: CDS
(B) LOCATION: 1..108

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

GGA AAT AAT AAC GCA TGC AAG AAT CAG TGC ATT CGA CTT GAG AAA GCA 48
Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala
1 5 10 15
CGA CAT GGG TCT TGC AAC TAT GTC TTC CCA GCT CAC AAG TGT ATC TGT 96
Arg His Gly Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys
20 25 30
TAT TTC CCT TGT TAATTCATA AACTCTTCGG TGGTTAATAG TGTGCGCATA 148
Tyr Phe Pro Cys
35
TTACATATAA TTAATAAGTT TGTGTCAC TAATTATAGT ACTTTATGAC ATGTGCCAGG 208
TATGTTTATG TTGGGTTGGT TGTAATATAA AAAAGTTCAC GGATAATAAG ATGATAAGCT 268
CACGTCGCCA AAAAAA 284

(2) INFORMATION FOR SEQ ID NO:51:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 36 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala
1 5 10 15
Arg His Gly Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys
20 25 30
Tyr Phe Pro Cys
35

(2) INFORMATION FOR SEQ ID NO:52:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 36 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: both
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

ATAGAATTTCG ACGTGAGCTT ATCATCTTAT TATCCG

36

(2) INFORMATION FOR SEQ ID NO:53:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 21 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:53:

CTTGGCCTTT GGCACAACTT C

21

(2) INFORMATION FOR SEQ ID NO:54:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 21 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:54:

GCTTTCTCAA GTCTAATGCA C

21

(2) INFORMATION FOR SEQ ID NO:55:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 41 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:55:

AACTCGAGCT GCAGTGTCGA CCTATTAACA AGGAAAGTAG C

41

(2) INFORMATION FOR SEQ ID NO:56:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 40 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:56:

GGAATAGCCG ATCGAGATCT AGGAAACAGC TATGACCATG 40

(2) INFORMATION FOR SEQ ID NO:57:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: both

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:57:

GGAATAGCCG ATCGAGATCT AGGA 24

(2) INFORMATION FOR SEQ ID NO:58:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 288 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: both

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 43..282

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:58:

CCCCGGGCTG CAGGAATTCG CGGCCGCGTT TTATTAGTGA TC ATG GCT AAG TTT 54
Met Ala Lys Phe
1

GCG TCC ATC ATC GCA CTT CTT TTT GCT GCT CTT GTT CTT TTT GCT GCT 102
Ala Ser Ile Ile Ala Leu Leu Phe Ala Ala Leu Val Leu Phe Ala Ala
5 10 15 20

TTC GAA GCA CCA ACA ATG GTG GAA GCA CAG AAG TTG TGC CAA AGG CCA 150
Phe Glu Ala Pro Thr Met Val Glu Ala Gln Lys Leu Cys Gln Arg Pro
25 30 35

AGT GGG ACA TGG TCA GGA GTC TGT GGA AAC AAT AAC GCA TGC AAG AAT 198
Ser Gly Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys Asn
40 45 50

CAG TGC ATT AGA CTT GAG AAA GCA CGA CAT GGA TCT TGC AAC TAT GTC 246
Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Val
55 60 65

TTC CCA GCT CAC AAG TGT ATC TGC TAC TTT CCT TGT TAATAG 288
Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys
70 75 80

(2) INFORMATION FOR SEQ ID NO:59:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 80 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:59:

Met	Ala	Lys	Phe	Ala	Ser	Ile	Ile	Ala	Leu	Leu	Phe	Ala	Ala	Leu	Val
1				5					10					15	
Leu	Phe	Ala	Ala	Phe	Glu	Ala	Pro	Thr	Met	Val	Glu	Ala	Gln	Lys	Leu
			20					25					30		
Cys	Gln	Arg	Pro	Ser	Gly	Thr	Trp	Ser	Gly	Val	Cys	Gly	Asn	Asn	Asn
		35					40					45			
Ala	Cys	Lys	Asn	Gln	Cys	Ile	Arg	Leu	Glu	Lys	Ala	Arg	His	Gly	Ser
	50					55					60				
Cys	Asn	Tyr	Val	Phe	Pro	Ala	His	Lys	Cys	Ile	Cys	Tyr	Phe	Pro	Cys
65					70					75					80

002254-0420